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**FINAL TECHNICAL REPORT**

**TO**

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

**FROM**

**THE UNIVERSITY OF TEXAS AT DALLAS  
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**ON**

**"A RESEARCH IN SUPPORT OF NASA'S SPACE SCIENCE"**

**NASA Grant NGL 44-004-130  
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(New Account 22971-961)**

**W. B. Hanson  
Principal Investigator**

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The NASA Center of Excellence grant to The University of Texas at Dallas did much to maintain the excellence in space research carried out at this institution. From the view of UTD the program was well administered by NASA, and our grant provided the continuity and flexibility required to respond to the new challenges and opportunities that arose in many areas of space research. We were greatly disappointed when this program, which had been extremely effective on our campus, was redirected toward specific objectives in a move that centralized planning at NASA Headquarters and reduced the capability on university campuses to influence the future directions of space activities. Our refusal to accept this change, which promised a near total loss in flexibility in our operations, effectively forced us out of the program.

During the dozen years that UTD participated in the Center of Excellence program we published 38 papers in 9 different media (but mostly in the Journal of Geophysical Research) that acknowledged assistance from this grant, for an average of approximately 3 per year. These papers are listed in the attached bibliography. Their subject material is too varied to review here in any detail, but some of the many subjects dealt with are

- Cosmic ray anisotropies
- Low energy auroral particles
- Helium and hydrogen airglow
- Many different aspects of ionospheric irregularities
- Thermospheric winds
- Interhemisphere ion transport
- Ion cyclotron heating
- Ion temperature morphology
- Ion chemistry
- Ion convection
- Spacecraft interactions with the atmosphere and ionosphere

The Center of Excellence grant did far more than just support the research appearing in these specific papers. It allowed us to investigate options and make proposals for new instruments and to assist in new mission plans. A specific example of this is the Ion Drift Meter developed for the Atmosphere Explorer mission as an adjunct to the UTD Retarding Potential Analyzer. This development occurred after the mission payload was defined and it had been decided that no electric field measurements could be supported because of the extremely high drag at perigee. Incorporation of the Ion Drift Meter allowed the AE satellites to make the first vector ion velocity measurements, and provided the first satellite vector measurements of the auroral ion convection. This new concept has since been utilized in several other missions, and has also provided great insight to the plasma behavior in many other interesting circumstances (e.g., within equatorial plasma "bubbles" and other irregularities).

The Center of Excellence program at NASA was a genuine success that contributed substantially to the effectiveness and efficiency of the space research program of the nation; it should be looked back on with pride.

PUBLICATIONS ACKNOWLEDGING NASA GRANT NGL 44-004-130

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